Carpholite $Mn^{2+}Al_2Si_2O_6(OH)_4$

Crystal Data: Orthorhombic. *Point Group:* $2/m\ 2/m\ 2/m$. Crystals acicular, prismatic; fibrous, as radiated tufts, to 2 cm. *Twinning:* On {100}.

Physical Properties: *Cleavage:* Perfect on {010}. *Tenacity:* Very brittle. Hardness = 5.5–6 D(meas.) = 2.935–3.031 D(calc.) = [3.07]

Optical Properties: Semitransparent. *Color:* Yellow. *Luster:* Silky, glistening. *Optical Class:* Biaxial (–). *Pleochroism:* Distinct; $X = Y$ = pale yellow; Z = colorless. $\alpha = 1.624$ $\beta = 1.629$ $\gamma = 1.638$ 2V(meas.) = n.d. 2V(calc.) = 67°

Cell Data: *Space Group: Ccca.* $a = 13.714(2)$ $b = 20.079(2)$ $c = 5.105(1)$ Z = 8

X-ray Powder Pattern: Fukuzumi mine, Japan.
5.73 (100), 5.08 (70), 2.620 (50), 3.46 (30), 3.04 (30), 3.39 (20), 2.761 (20)

Chemistry:

	(1)	(2)	(3)
SiO_2	36.61	38.38	36.52
TiO_2	trace	trace	
Al_2O_3	29.36	29.45	30.98
Fe_2O_3	1.53	1.47	
V_2O_5		0.06	
FeO	3.05	0.22	
MnO	18.08	17.77	21.55
ZnO		0.12	
MgO		1.92	
CaO	trace		
Na_2O		0.19	
K_2O		0.08	
H_2O^+	11.03		
H_2O^-	0.32		
H_2O		10.19	10.95
Total	99.98	99.85	100.00

(1) Fukuzumi mine, Japan. (2) Near Meuville, Belgium; Loss on ignition taken as H_2O. (3) $MnAl_2Si_2O_6(OH)_4$.

Polymorphism & Series: Forms a series with ferrocarpholite.

Occurrence: In low-grade metamorphosed shales.

Association: Sudoite, manganoan garnet, chlorotoid, fluorite.

Distribution: At Horní Slavkov (Schlaggenwald), Czech Republic. From near Meuville, Ardennes Mountains, Belgium. At Wippra, Harz Mountains, Germany. In England, from the Carrock mine, Caldbeck Fells, Cumbria; at Kit Hill Consols, Stokeclimsland, in the Hingston Down Consols mine, near Calstock, and in the Stenna Gwynn mine, St. Stephen-in-Brannel, Cornwall. In the Fukuzumi mine, Kyoto Prefecture, Japan.

Name: From the Greek for *straw*, in allusion to its color.

References: (1) Dana, E.S. (1892) Dana's system of mineralogy, (6th edition), 549. (2) Yoshimura, T. and Y. Aoki (1966) Carpholite from the Fukuzumi mine, Hyogo Prefecture. J. Mineral. Soc. Japan, 8, 43–48. (3) (1967) Mineral. Abs., 18, 200 (abs. ref. 2). (4) A.-M. Fransolet (1972) Données nouvelles sur la carpholite de Meuville (vallée de la Lienne, Belgique). Bull. Soc. fr. Minéral., 95, 84–97 (in French with English abs.). (5) Lindemann, V.W., R. Wögerbauer, and P. Berger (1979) Die Kristallstruktur von Karpholith. Neues Jahrb. Mineral., Monatsh., 282–287 (in German with English abs.). (6) Ghose, S., P.K. Sen Gupta, R.C. Boggs, and E.O. Schlemper (1989) Crystal chemistry of a nonstoichiometric carpholite, $K_x(Mn_{2-x}Li_x)Al_4Si_4O_{12}(OH)_4F_4$: a chain silicate related to pyroxenes. Amer. Mineral., 74, 1084–1090.